Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

A280.39
M34Amo

# POTENTIALS OF THE ST. LAWRENCE SEAWAY FOR MARKETING UNITED STATES AGRICULTURAL COMMODITIES

LIBRARY
CURRENT SERIAL RECORD
★ JUL 26 1960 ★
U. S. DEPARTMENT OF AGRICULTURE

Reprinted from
THE MARKETING AND TRANSPORTATION SITUATION
July 1957

U. S. DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service

Washington, D. C.

AMS-205

# POTENTIALS OF THE ST. LAWRENCE SEAWAY FOR MARKETING UNITED STATES AGRICULTURAL COMMODITIES 1/

This article analyzes the short-run potentials of the St. Lawrence Seaway by studying some of the physical problems encountered and the competition for shipping space among commodities. As these projected problems become realities, improvements in the route may be made and the Seaway potential may continue to increase. Even with these improvements, however, it is likely that the Great Lakes-St. Lawrence route will remain primarily an inland waterway. Apparently, this route will not provide lower cost transportation between the Midwest and the eastern seaboard. Direct overseas shipments from the Great Lakes probably will increase. It seems unwarranted, however, to visualize immediate and material changes in existing transportation channels for agricultural products from the United States when the Seaway is completed.

What potentials will the St. Lawrence Seaway have for the marketing and transportation of United States agricultural commodities over the next few years? "The St. Lawrence Seaway" is a name applied to what will be an improved waterway between Ogdensburg, New York, and Montreal (fig. 1). At present the controlling depth for ships in this stretch of the river is 14 feet. The maximum tonnage for ships on the present route is about 3,000 tons. Improvements being made will provide 27-foot channels and seven locks 800 feet long by 80 feet wide. This will enable lake-type ships of up to 25,000 tons and ocean ships of up to 9,000 tons load capacity to navigate through the St. Lawrence waterway. 2/

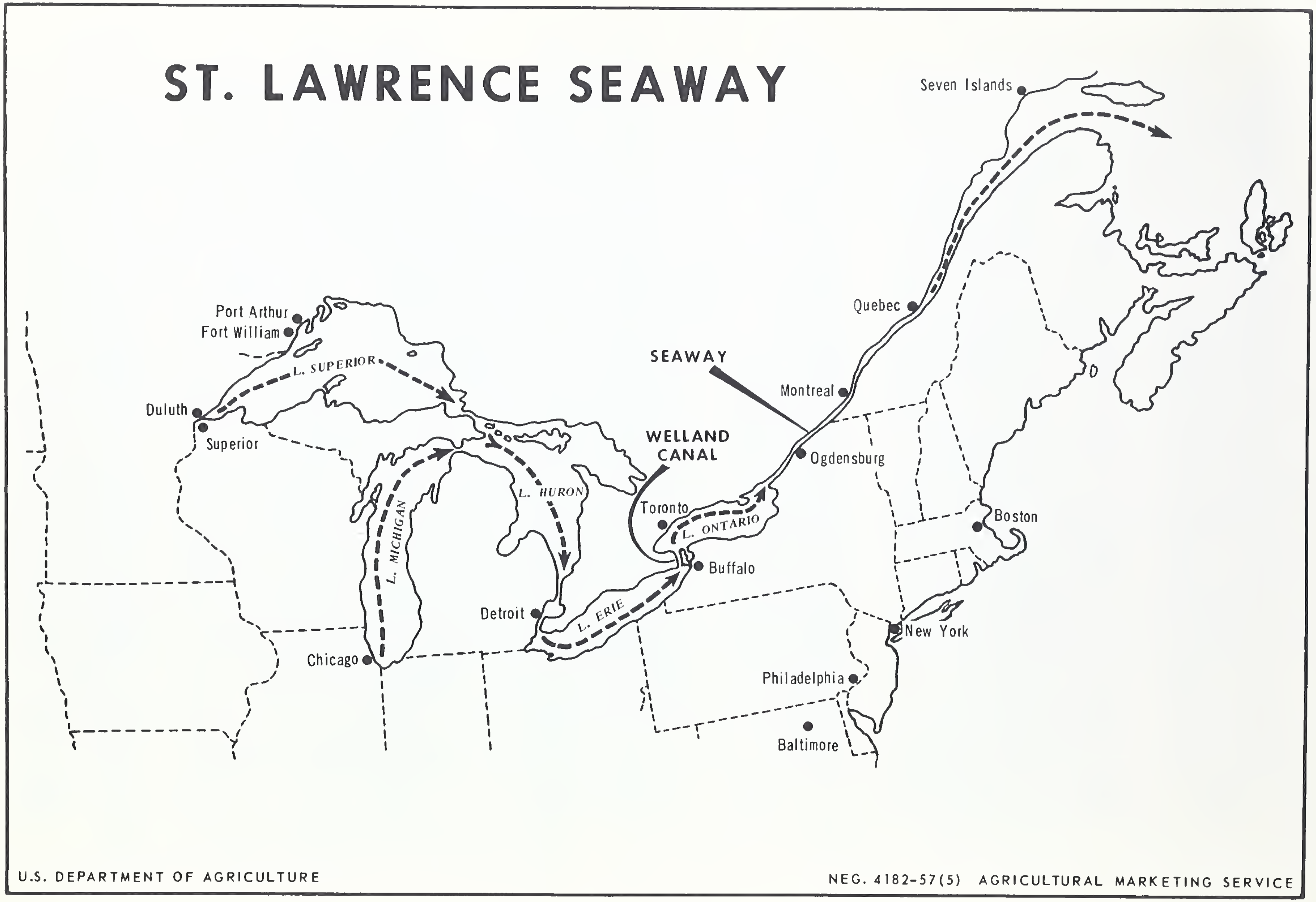
There is great interest in the possibility that additional United States farm products, grain in particular, might move to foreign and domestic markets via this improved route. Transportation to ports of export today is by an all-rail route, or by the Great Lakes to Buffalo and then by rail, or down the Mississippi River. Small quantities of United States grain are now exported via the St. Lawrence. Larger movements took place before World War II. 3/

---

1/ Prepared by Sargent Russell, Assistant Professor of Agricultural Economics, University of Massachusetts, while temporarily employed by the Market Organization and Costs Branch, Agricultural Marketing Service, USDA.

2/ A lake-type ship is longer for its depth than an ocean-type ship and can therefore carry heavier loads in the same depth of water. Lake ships which do not encounter as large waves as do ships on the ocean might break in two in the ocean.

3/ This is the second article on the potentials of the Seaway route to be published in this Situation. See Phillips, S. W., "American Farmers and the St. Lawrence Seaway," The Marketing and Transportation Situation, MTS-118, July 1955.



ST. LAWRENCE SEAWAY

U.S. DEPARTMENT OF AGRICULTURE

NEG. 4182-57(5) AGRICULTURAL MARKETING SERVICE

Figure 1

The Seaway is only one segment of this great inland waterway. The water route west of the Seaway also needs to be developed. For example, the interlake channel depths at Detroit are today 21 feet upbound and 25 feet downbound. [4] In March 1956 the United States authorized the Corps of Engineers to deepen the upbound and downbound interlake channels to 27 feet. Total cost has been estimated at 150 million dollars. The earliest completion date is 1963.

Harbor depths are another important consideration. The present harbor depths at Cleveland, Detroit, and Chicago are 25 or 26 feet. These can and probably will be deepened.

In examining the entire route and without trying to guess what future developments may be, this article considers the potentialities in: (1) The length of shipping season, the Welland Canal, and the 27-foot "sea" route; (2) commodity movements - United States coal and Canadian grain; (3) direct overseas service; and (4) costs for domestic service. These potentials are examined in the following sections to determine whether movement of United States agricultural commodities on the Great Lakes-St. Lawrence route can or will expand under improved conditions that are now planned.

## Physical Potentials of the "Seaway" Route

Many assume that once the St. Lawrence River and interlake channel improvements now under way are completed, movements via the Seaway will attract unlimited ocean shipping. But the shipping season is no more than 8 months long, and there is the possibility that the Welland Canal may become a serious bottleneck. Furthermore, the Great Lakes-St. Lawrence route with channel depths of 27 feet and many locks and its tolls will be a comparatively shallow, slow and expensive route for ocean-going ships.

### Welland Ship Canal Capacity

The Welland Ship Canal, completed in 1932, was built and is operated entirely by Canada. The canal is 25 miles long, with three twin locks and five single locks. Lock size is similar to those being built on the St. Lawrence. The present 25-foot deep canal is being deepened to 27 feet. It is here that the 326-foot difference in level between Lakes Ontario and Erie is overcome.

The capacity of the Welland Canal is vital to all lake port shipments destined for overseas or to domestic seaboard markets. Its cargo capacity is based on estimates of length of shipping season, time required for moving a ship through a lock and the cargo tonnage carried by the ship. Canadians who have studied the Welland Canal report a practical working capacity of about 46 million tons for movements in both directions. [5] One-way capacity would be only 23 million tons. The length of the shipping season varies with the weather. In the 5 years, 1951-55, the opening day at the Welland varied from March 22 to March 30, and the closing day from December 17 to December 20. Roughly, the season is 266 days long - about 3 weeks longer than that on the St. Lawrence. 6/ For the entire Atlantic to Duluth route the season is from about April 10 to December 10, or 244 days.

---

[4] "Upbound" means inland from the ocean against the flow of water in the Lakes. "Downbound" is with the flow of water toward the ocean.

[5] These figures were attributed to Canadian officials by Brig. Gen. B. L. Robinson, Chief of Engineers, Department of the Army, in testimony at the Senate hearings on the St. Lawrence Seaway April 14, 1953, and by N. R. Danielian, President of the Great Lakes-St. Lawrence Association, in a speech before the Detroit Economic Club luncheon, Nov. 15, 1954.

The time required per lockage at the Welland is about 50 minutes, which permits a total of 28 lockages a day, or 14 a day in each direction. 7/ The theoretical maximum number of lockages in 244 days would be 6,832. The practical maximum number of lockages is estimated at 5,770, or 2,885 in each direction. This lower figure allows for delays and noncargo lockages.

The amount of cargo passed through in each lockage depends upon ship capacity and use of cargo space. The average cargo capacity of Canadian Upper Lake freighters is slightly more than 10,000 tons. The average capacity of United States registry Great Lakes ships, excluding those less than 3,000 tons, is about 11,000 tons. In 1955 about 70 percent of the ships using the Welland Canal were Canadian. If an average of 10,000 tons of cargo were locked through for each of 5,770 lockages, the capacity of the Welland Canal would be 57,700,000 tons.

Actual per ship tonnages even for the larger ships have been less than 10,000 tons. The President of the St. Lawrence Seaway Authority has reported that 56 percent of the cargo tonnage moved through the Welland in 1953 was carried in Upper Lake ships. 8/ Upper Lake ships, however, accounted for only 23 percent of the total passages. Applying these percentages to the tonnage and ship passages for downbound movements on the Welland Canal in 1953, it appears that the average cargo load was about 9,000 tons for the Upper Lake ships. At 9,000 tons per lockage, the capacity of the Welland would be slightly under 52 million tons.

These two estimates - 57.7 and 52.0 million tons - have assumed that all cargoes would move in the larger lake ships. It would have required almost an 80 percent increase in available carrying capacity of larger ships to handle the cargoes that were handled by smaller ships in 1953. Thus, with the ships which are available, the loads which they carry and the number of passages which can be made, the Canadian estimate of 46 million tons two-way capacity may be reasonable.

This capacity will increase as ship capacities increase and small ships are replaced by larger ones. Traffic control and additional guard locks at the Welland Canal might also increase capacity. If the Canal becomes a serious bottleneck, the five single locks could be twinned by Canada for an estimated 125 million to 150 million dollars. Canada is considering this possibility.

In order to relate the importance of this capacity to future movements, it is necessary to examine present usage and flows. In each of the 5 years, 1951 through 1955, the average number of ships per day using the Welland Canal was greater than the maximum number of lockages (table 13). 9/ This is possible because more than one small ship can be locked through at one time. In June 1955, 1,322 ships were locked through - an average of more than 1.5 ships per lockage.

---

6/ In the period 1951-55 the number of shipping days ranged from 263 to 268. Dominion Bureau of Statistics, Canal Statistics, Annual Reports for 1951-55.

7/ A "lockage" is the process of moving a ship into a lock, changing the water level, and moving the ship out of the lock.

8/ Chevrier, Lionel, Speech to the Canadian Association of British Manufacturers and Agencies, Toronto, Ontario, April 15, 1955.

9/ The range was from 30.4 ships per day in 1951 to 35.5 ships per day in 1955. Dominion Bureau of Statistics, Canal Statistics, Annual Reports for 1951-55.

Table 13.- Number of vessels using Welland Canal, 1951-55

| Country of registry type of vessel, and total | 1951 | 1952 | 1953 | 1954 | 1955 |
|---|---|---|---|---|---|
| Canada | | | | | |
| Steam | 5,918 | 6,864 | 6,922 | 6,140 | 5,504 |
| Other than steam 1/ | 170 | 95 | 138 | 80 | 1,001 |
| Total | 6,088 | 6,959 | 7,060 | 6,220 | 6,505 |
| United States | | | | | |
| Steam | 1,399 | 1,369 | 1,210 | 1,248 | 477 |
| Other than steam 2/ | 428 | 516 | 551 | 488 | 1,670 |
| Total | 1,827 | 1,885 | 1,761 | 1,736 | 2,147 |
| Other countries | | | | | |
| Steam | --- | --- | --- | --- | 129 |
| Other than steam | --- | --- | --- | --- | 553 |
| Total | 198 | 314 | 551 | 523 | 682 |

1/ Total for 1955 includes 934 motor, 61 unrigged, and 6 "other" vessels.

2/ Total for 1955 includes 968 motor, 685 unrigged, and 17 "other" vessels.

Dominion Bureau of Statistics, Canal Statistics, Annual Reports for 1951-55.

Although the number of ships moving up and down through the Welland Canal is about equal, 16,634,000 tons of cargo moved downbound in 1955 and 4,260,000 tons upbound. The average annual downbound movement in the years 1951-55 was 15,556,000 tons (table 14). The present downbound flow is beginning to tax the capacity of the Welland Canal. The 5-year average downbound movement was 68 percent of the estimated one-way capacity of 23 million tons. Downbound movement in 1955 was 72 percent of capacity but upbound was only 18 percent of capacity.

Table 14.- Freight carried through Welland Ship Canal, 1951-55

| Direction of movement and total | 1951 | 1952 | 1953 | 1954 | 1955 | Average 1951-55 |
|---|---|---|---|---|---|---|
| | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons |
| Up | 2,752 | 2,289 | 2,582 | 2,396 | 4,260 | 2,856 |
| Down | 13,445 | 15,622 | 16,960 | 15,118 | 16,634 | 15,556 |
| Total | 16,197 | 17,911 | 19,542 | 17,514 | 20,894 | 18,412 |

Dominion Bureau of Statistics, Canal Statistics, Annual Reports for 1951-55.

Even if we assume that all movements downbound through the canal in 1955 could have been made in larger lake vessels (with an average load of 9,000 tons as computed above), they would have required 1,848 lockages. This is 64 percent of the practical maximum downbound lockages.

The extent of the usage of the Welland Canal is further indicated in the following statement made by the President of the Canada Steamship Lines to the Canadian Royal Commission on Coasting Trade on June 30, 1955: "Since 1945 the number of vessel passages per season (through the Welland Ship Canal) has grown from about 6,500 to 9,400 at a sacrifice of some 40 percent average increase in passage time. This factor alone results in Canada Steamship Lines vessel income being some $250,000 yearly less than it would be if their ships could traverse the Welland Canal in the same average passage time as they did in 1945. ... It appears evident ... that the large tonnage which it is anticipated will move through the Welland Canal after the completion of the Seaway cannot possibly be handled satisfactorily within the existing Welland Canal system, with its single locks, bridges, and other time-consuming factors."

This statement would appear to cast some doubt on appreciable increase over present use in downbound movements through the Welland Ship Canal. However, in view of the Canadian estimate of 23 million tons of capacity compared with 16 to 17 million now moving downbound through the canal, an increase of 6 to 7 million tons is possible. If 9,000 tons of cargo were to move through for each lockage, an increase of 8 to 9 million tons above present usage will be possible by using larger ships and maintaining a relatively even flow through the entire shipping season. Twinning the single locks, as already mentioned, would further add to canal capacity.

## The 27-Foot "Sea" Route

The third limiting physical potential of the Great Lakes-St. Lawrence route is the channels and locks. A depth of 27 feet is not sufficient to accommodate readily most fully loaded ocean-going ships. In 1953 less than 18 percent of the total United States sea-going vessels (1,000 gross tons or more) had a draft of 26-1/2 feet or less. For similar foreign ships the proportion was 67 percent. 10/ In order to achieve safe clearance, however, many of these ships would have to traverse the Seaway with only enough fuel, fresh water, and stores to supply them during the seaway journey. The current estimate of the maximum load which an ocean-going vessel could carry on the Seaway, after it is deepened to 27 feet, is 9,000 tons.

Passage through restricted channels and locks adds 1 or 2 days compared with the time required for moving similar distances in open water. Each day of operation for an ocean-going ship of 8,000 to 9,000 tons capacity costs $2,000 to $3,000. This covers all costs except tolls and applies to older ships and foreign flag vessels.

Tolls will add another expense on the Seaway from Montreal to Lake Ontario. The Department of Commerce suggested 50 cents a ton for iron ore, 25 to 35 cents for grain and coal, and $1.25 for general cargo. 11/

---

10/ Data supplied by the U. S. Maritime Commission in Senate hearings on the St. Lawrence Seaway, April and May 1953.

11/ Senate hearings on the St. Lawrence Seaway, April and May 1953.

The Seaway's limitations on use by ocean-going ships will determine partly its share of domestic and export trade. All cargoes for domestic trade must move in United States flag ships according to law. Restrictions on ship size and high cost of operation for United States ships may discourage establishment of such a service. Export cargoes likely will move first in lake-type ships to deeper water points at Montreal and other lower St. Lawrence points. This is true because lake-type vessels of much greater load capacity than ocean-going ships but only slightly increased operating cost will be able to operate in the 27-foot depths. There is, of course, the possibility that new types of ocean ships designed especially for the Seaway may come into use.

## Potential Commodity Movements

Physical limitations of the St. Lawrence Seaway, particularly the Welland Canal, may create competition for available cargo space. Present use and preferences give some indication of how the competition will turn out.

Grain and soft coal equally shared about two-thirds, or 10.3 million tons, of the total tonnage downbound through the Welland Canal during 1951-55, accounting for 5.0 and 5.3 million tons, respectively. Iron ore accounted for an additional 2.5 million tons a year, petroleum and petroleum products about 1.8 million tons, and all other about 1.1 million tons. (Data for 1955 are in table 15.)

Enlargement of the St. Lawrence waterway may make it a more economical route for two types of shipments: (1) Supplying Lake Ontario ports via the St. Lawrence River rather than the Welland Canal; and (2) movements from above the Welland Canal to Montreal or below which use both the Welland and the St. Lawrence. At present, many cargoes in the latter category are transshipped for passage over the St. Lawrence. Both movements may increase because larger ships will be able to operate on the St. Lawrence and offer lower shipping rates.

Iron ore, other mine products, and crude petroleum now move predominantly down the Welland but up the St. Lawrence (table 15). These are commodities which might be supplied to Lake Ontario ports in larger amounts by the St. Lawrence and relieve the Welland route. Iron ore and concentrates offer the best opportunity for a shift of this type. In 1955, however, 1.6 million tons of iron ore moved up the Welland while 2.8 million tons moved down. This inconsistency seems to indicate that factors other than the elimination of cross hauling or the lowest cost transportation route are important in determining the transportation of iron ore. One factor may be that iron and steel plants are owned by different companies, and another may be the composition of the ores. Cross hauling, apparent or real, is a common phenomenon. The fact that it exists may be reason enough to believe that it will continue. Thus, iron ore coming up the St. Lawrence may not supplant iron ore moving down the Welland.

Table 15.- Freight carried through Welland Ship Canal and St. Lawrence Canals, by commodities, 1955

| Commodity | Welland | | St. Lawrence | |
|---|---|---|---|---|
| | Up | Down | Up | Down |
| | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons |
| Animals and animal products | 5 | 12 | 7 | 16 |
| Grain, flour, and other grain products | 15 | 5,313 | 2 | 3,740 |
| Other agricultural products | 2 | 5 | 2 | 19 |
| Bituminous coal | 12 | 5,406 | 4 | 1,593 |
| Other coal and coke | 3 | 15 | 4 | 8 |
| Iron ore and concentrates | 1,587 | 2,810 | 1,751 | 0 |
| Other ores and concentrates | 35 | 3 | 36 | 3 |
| Other mine products | 43 | 111 | 208 | 34 |
| Crude petroleum | 4 | 1,000 | 268 | 0 |
| Gasoline | 168 | 255 | 53 | 49 |
| Fuel oil | 508 | 337 | 866 | 118 |
| Other petroleum products | 337 | 113 | 93 | 36 |
| Sand, gravel, and crushed stone | 107 | 65 | 28 | 215 |
| Salt | 0 | 105 | 0 | 101 |
| Pulpwood | 343 | 167 | 439 | 0 |
| Woodpulp | 33 | 20 | 35 | 1 |
| Other forest products | 0 | 1 | 34 | 0 |
| Newsprint | 351 | 17 | 166 | 5 |
| All iron and steel except scrap | 44 | 129 | 17 | 47 |
| Scrap iron and steel | 25 | 216 | 4 | 10 |
| All other | 638 | 534 | 765 | 670 |
| Total | 4,260 | 16,634 | 4,782 | 6,665 |

Dominion Bureau of Statistics, Canal Statistics, Annual Report for 1955.

The prospects for change in source of supply for crude petroleum to Lake Ontario ports seem to rest on the relative price of crude petroleum in the United States and Alberta compared with overseas crude petroleum and on the building of pipelines. With the development of oil production in Alberta and completion of the St. Lawrence Seaway, Alberta oil might move as far as Montreal which would increase volume of crude petroleum downbound through the Welland. 12/ The primary direction of flow at present for refined petroleum, however, is upbound on both the Welland and the St. Lawrence. Thus, as capacity of refineries is increased on the west or upside of the Welland Canal, there may be less call for crude petroleum at Lake Ontario points. This would reduce downbound movements on the Welland.

---

12/ Francis S. Doody, "The St. Lawrence Project and New England," Boston University Business Review, Boston University College of Business Administration, Boston, Mass., Spring 1955, Vol. 2, No. 1

If overseas prices of crude petroleum fall sufficiently, a greater volume could be supplied to Lake Ontario points via the St. Lawrence. Pipelines, however, seem to be favored in moving petroleum in the Great Lakes area. A pipeline from Portland, Maine, now provides Montreal a year-round source of crude petroleum from overseas. The pipeline from Superior, Wisconsin, to Sarnia, Ontario, is another now operating. If additional lines are built, movements on the Great Lakes may decrease.

Nevertheless, United States shipments of petroleum are from west to east, generally. If Canadian shipments to the east also gain, downbound traffic on the Welland may not decrease. Development of pipelines and the increased use of overseas oil, however, would determine any change in volume.

Coal and grain cargoes will figure in greater joint use of the Welland and St. Lawrence, thereby increasing downbound tonnage on the Welland. These two commodities, plus iron ore and all petroleum products, account for all but 1.4 million tons which moved downbound through the Welland in 1955.

Data on joint as well as single use of the Welland and St. Lawrence Canals in 1955 show that only about half of the grain and coal which moved down the St. Lawrence had joint movement down the Welland (table 16). More than 1.3 million tons of grain and 0.9 million tons of coal moved downbound on the St. Lawrence which had not moved downbound on the Welland.

Table 16.- Downbound freight movements on the Welland and St. Lawrence Canals (excluding duplications), 1955

| Canal | Barley | Wheat | Crude petroleum | Soft coal | Iron ore | All other | Total |
|---|---|---|---|---|---|---|---|
| | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons |
| St. Lawrence only ........ | 372 | 993 | --- | 916 | --- | 1,130 | 3,411 |
| St. Lawrence and Welland . | 510 | 1,034 | --- | 678 | --- | 1,032 | 3,254 |
| Welland only .. | 724 | 1,690 | 1,000 | 4,728 | 2,810 | 2,428 | 13,380 |

Dominion Bureau of Statistics, Canal Statistics, Annual Report for 1955.

Practically all grain and coal for downbound shipment on the St. Lawrence originate at points above the Welland. Furthermore, the combination of Welland only shipments, plus joint Welland and St. Lawrence shipments, equals the total shipments for the Welland Canal. This, plus the origin of coal and grain, indicates that the coal and grain which moved only on the St. Lawrence were not transshipments of Welland movements.

Once the St. Lawrence route is improved, it may not be as expedient to bypass the Welland. Larger ships will be able to use the St. Lawrence, and the sooner the commodity moves by ship the lower the total transportation charge will be. Therefore, the 2.2 million tons of grain and coal which bypassed the Welland in 1955 may fill part of the 6 to 7 million ton gap estimated as now existing between present use and capacity of the Welland Canal.

## Potential for Increased Coal Shipments

More through shipments of coal as well as an increase in total amount of coal shipped on the completed waterway will increase downbound traffic on the Welland. Such an increase may occur because the rate of both industrial and population growth in Canada is rapid, with population concentrated along Lake Ontario and the St. Lawrence River. Furthermore, Canadians prefer United States coal over Canadian coal due to quality and price factors.

Coal may be a backhaul cargo for ships carrying an estimated 10 million tons of iron ore from Seven Islands and other foreign sources. Shipments of this volume are expected to move up the Seaway to Lake Erie ports in 1959, the first year of navigation. Tonnages of ore and coal may materially increase as time goes on. 13/

In 1955, downbound coal shipments through the Welland were 5.4 million tons. An additional 0.9 million tons, already mentioned, moved downbound on the St. Lawrence. The difference between 10 million tons of upbound iron ore and downbound coal would be 3.7 million tons. The 2.8 million tons of iron ore moved downbound through the Welland Canal might also be a backhaul cargo. Subtraction of this tonnage from the 3.7 million tons would leave 0.9 million tons of ship cargo capacity for coal.

Nova Scotian coal producers, who supply about 2 million tons of coal to the Quebec market, will try to retain or increase their market in Montreal in competition with United States producers. They may also try to regain that part of the Toronto market which they had before World War II. Their success probably will depend most upon the level of transportation subsidies granted by the Dominion Coal Board. In 1952, the average assistance paid on Nova Scotia coal shipped by water to St. Lawrence River ports was about $1.45 per ton. It is estimated that opening of the Seaway may reduce transportation costs for United States shippers by $1.00 per ton. 14/ The Canadian subsidy will probably be the dominant factor in determining future increases in United States coal shipments to Canada.

---

13/ Chevrier, Lionel. Address to the Canadian Association of British Manufacturers and Agencies, Toronto, Ontario, April 15, 1955.

14/ Cumming, R. Stanley, "The St. Lawrence Seaway and Nova Scotia's Economy," reprint from The Dalhousie Review, Halifax, Nova Scotia.

## Potential for Increased Canadian Grain Shipments

Canadian grain may be another competitor for United States agricultural commodities in filling the capacity gap at the Welland Canal. The quantity of Canadian grain shipped over the Welland-St. Lawrence route may depend largely on how much grain Canada has available for export. Other factors will be location of carryover, time of grain harvest, and costs of export at Churchill or west coast ports relative to eastern ports. Volume of export looks like the principal factor as seen by examining export clearances (table 17), receipts by vessel and rail at lower St. Lawrence ports (table 18), and flows through the St. Lawrence canals. In the crop years 1951-52 and 1952-53, exports were relatively high. Rail receipts of grain at lower St. Lawrence ports in these two crop years were over 3 million tons compared with less than a million tons in the next 2 crop years. Movements through the St. Lawrence canals for the years 1952-55, however, were stable at about 4 million tons. 15/ Reliance on water transport is reflected further in the receipts of grain at Maritime ports. In the crop year 1953-54 when total exports were low, receipts at Maritime ports were very low.

Table 17.- Export clearance of Canadian grain to overseas destinations, crop years 1951-52 to 1954-55 1/

| Seaboard area and crop | 1951-52 | 1952-53 | 1953-54 | 1954-55 |
|---|---|---|---|---|
| | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons |
| Lower St. Lawrence | 5,346 | 6,706 | 2,937 | 3,736 |
| Atlantic coast | 707 | 1,120 | 368 | 1,139 |
| Fort William-Port Arthur (direct) | 3 | 14 | 19 | 4 |
| Pacific coast | 3,333 | 3,532 | 3,876 | 2,814 |
| Churchill | 226 | 259 | 329 | 367 |
| United States ports 2/ | 184 | 115 | 3 | 34 |
| Total | 9,799 | 11,746 | 7,532 | 8,094 |
| | | | | |
| Wheat | 7, 982 | 9,183 | 6,033 | 6,205 |
| Barley | 1,433 | 2,274 | 1,275 | 1,392 |
| Oats | 176 | 85 | 64 | 109 |
| Rye | 127 | 90 | 15 | 211 |
| Flaxseed | 81 | 114 | 145 | 177 |
| Total | 9,799 | 11,746 | 7,532 | 8,094 |

1/ In addition to grain exports, wheat flour exports in thousands of tons were 1,533 in 1951-52; 1,695 in 1952-53; 1,387 in 1953-54; and 1,219 in 1954-55.

2/ Albany, New York, and Norfolk.

Dominion Bureau of Statistics, Grain Trade of Canada, Annual Reports for 1951-52 to 1954-55.

---

15/ Dominion Bureau of Statistics, Canal Statistics, Annual Reports for 1952-55.

Table 18.- Receipts of Canadian grain at eastern elevators, by vessel and by rail, crop years 1951-52 to 1954-55 1/

| Location and transport | 1951-52 | 1952-53 | 1953-54 | 1954-55 |
|---|---|---|---|---|
| | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons |
| Lower St. Lawrence | | | | |
| Vessel .................... | 2,854 | 4,002 | 2,887 | 3,804 |
| Rail ...................... | 3,010 | 3,331 | 789 | 631 |
| Maritime Provinces | | | | |
| Vessel .................... | 1 | 2 | --- | --- |
| Rail ...................... | 714 | 1,240 | 411 | 1,154 |

1/ Receipts include wheat, oats, barley, rye, and flaxseed.
Dominion Bureau of Statistics, Grain Trade of Canada, Annual Reports for 1951-52 to 1954-55.

The cost of export via Canadian Pacific coast ports or Churchill relative to eastern ports could also influence the volume of grain which Canada may ship on the Welland-St. Lawrence route. If, as forecast, the cost of laying down wheat at lower St. Lawrence ports is reduced "in the neighborhood of 5 cents a bushel," 16/ some wheat and other grains may be diverted from Canadian Pacific coast export.

Since World War II, the amount of United States grain exported through Canadian eastern elevators has been small, despite lower transportation costs via Montreal rather than via New York, Boston, or Portland. The largest volume since 1951-52 was 207,000 tons of corn and flaxseed in the crop year 1953-54. 17/

Lower cost of export via Montreal compared with the eastern seaboard is indicated by present water and rail rates. The all-water rate for Canadian wheat from Fort William-Port Arthur to Montreal was 22.5 cents per 100 pounds in 1955. The water rate for Canadian grain in 1955 from Fort William-Port Arthur to Buffalo was 11.2 cents per 100 pounds and the export rail rate for wheat from Buffalo to New York was 23.25 cents per 100 pounds. Since ocean rates for exporting wheat are about the same from Montreal and from New York, the total of 34.45 cents per 100 pounds for moving wheat from Fort William-Port Arthur to New York via rail from Buffalo compared with 22.5 cents per 100 pounds for all-water shipments to Montreal indicates lower costs via Montreal of about 12 cents per 100 pounds. This saving would also accrue to United States shippers, assuming

---

16/ Chevrier, Lionel. Address to Canadian Association of British Manufacturers and Agencies, Toronto, Ontario, April 15, 1955.
17/ Dominion Bureau of Statistics, Grain Trade of Canada, Annual Reports for 1951-52 to 1954-55.

that costs in international trade would be the same for United States and Canadian grain. Although water rates were low in 1955, the differential between Montreal and Buffalo remained about the same in the years 1951-55. Rail rates were somewhat less early in this period.

Despite this apparent cost advantage, little United States grain, as indicated above, has moved for export through the St. Lawrence since World War II. N. R. Danielian, President of the Great Lakes-St. Lawrence Association, suggested one reason: "First and foremost, outbound grain shipments will probably have priority, at least in the eyes of the Canadian Government. This is not theoretical speculation. We have had information during this past year (1954) that American shippers of grain have been unsuccessful in securing passage through the 14 foot canals." 18/ C. D. Howe, former Canadian Minister of Trade and Commerce, has stated that, "the congestion of Canadian grain being handled on the St. Lawrence has made it impossible to handle United States export grain in addition." 19/

Technically, the United States has equal navigation rights with Canada in the use of the Great Lakes-St. Lawrence route, including the use of canals. This is set forth in Article I of the "United States-Canadian Boundary Waters: Treaty of 1909 between the United States and Great Britain." Selection of Canadian or United States grain for shipment, however, is made by grain handlers, including ship and elevator operators.

In 1955, a little over 90 percent of all vessel passages on the St. Lawrence canals were made by Canadian registry ships. 20/ All of the grain elevators which would be used for transshipping grain from lake to ocean ships at lower St. Lawrence ports are Canadian.

Capacity of these elevators may not be large enough to handle both Canadian and United States grain. Minister Howe has said, "I believe that in the future Canadian ports must be prepared again to handle considerable quantities of United States grain. This may well call for grain elevators in addition to those now in operation. This aspect deserves careful study by those responsible for our harbor facilities." 21/ Improvements and additional grain handling facilities are being provided at lower St. Lawrence ports.

This concern with grain handling facilities at lower St. Lawrence ports may indicate most grain exports will not be made directly from lake ports. The cost per cargo ton of operating an ocean-going ship in the Great Lakes may be higher than the cost for a lake ship. This is particularly important for bulk commodities like grain for which transshipment costs are low. Thus, the most likely pattern of grain export shipments would appear to be by lake bulk carrier to lower St. Lawrence ports and

---

18/ Danielian, N. R. Address at Detroit Economic Club luncheon, Detroit, Michigan, November 15, 1954.

19/ Howe, C. D. Address to Dominion Marine Association, Seigniory Club, Quebec, January 23, 1957.

20/ Dominion Bureau of Statistics, Canal Statistics, Annual Report for 1955.

21/ Howe, C. D. Address to Dominion Marine Association, Seigniory Club, Quebec, January 23, 1957.

then transshipment to ocean ships. This is in keeping with the statement of the President of the St. Lawrence Seaway Authority, "The Seaway is essentially an inland waterway and can never be anything else." 22/

General cargo for overseas foreign trade is another competitor for United States agricultural commodities in the use of the Welland Canal. Although several difficulties are suggested for the development of this trade, especially for agricultural commodities, any increase in the number of ships using the Welland Canal will add to the congestion which may develop.

With respect to potential commodity movements, therefore, available data and information appear to indicate that there are now about 2 million tons of coal and grain moving down the St. Lawrence, after bypassing the Welland. These may be added in the future to shipments through the Welland Canal when the Seaway is opened. Coal shipments may increase by another million tons due to lower transport costs on the St. Lawrence and supplant coal now reaching the lower St. Lawrence ports from Nova Scotia. In years of high grain exports by Canada, considerably more Canadian grain may also move along the Welland Canal-St. Lawrence route. Capacity of the Welland Canal is limited, and competition from coal and Canadian grain may limit movements of United States grain.

## Potential Direct Overseas Service

The first factor which favors direct overseas service from Great Lakes ports is lower cost of transportation from Great Lakes ports to overseas points compared with the present route by rail to Atlantic ports and then overseas. The next is interest shown by the Maritime Commission and United States shipping lines. The third factor is past development of direct overseas foreign trade with Lake ports.

Lower cost for direct water transport from Lake ports to European markets compared with rail-water transport via seaboard ports exists today. 23/ Looking to the future, it has been estimated in an earlier study that the added cost of shipping direct from Detroit to Antwerp by water compared with overseas shipping cost from Baltimore to Antwerp would range from $1.85 to $4.37 per long ton, depending on type of ship and percentage of ship capacity used. 24/ Thus, land transport cost from Detroit to Baltimore could be no more than 8.3 to 19.5 cents per 100 pounds, or the land-water cost would exceed the cost of shipping overseas direct from Detroit. Ships engaged in the direct overseas transport from Detroit would need to be used during the winter months at Atlantic ports. This comparison

---

22/ Chevrier, Lionel, as quoted by E. R. Axelson, The Financial Post, Toronto, Ontario, August 4, 1956.

23/ Brons, Wilbur J., a series of ten articles in The Journal of Commerce June 13, 14, 20, 21, 27, and 28 and July 5, 6, 11, 12, 1955.

24/ Vincent, Sydney A. "The Economics of Future European Great Lakes Freighter Service." Paper presented to Spring Meeting of The Society of Naval Architects and Marine Engineers, Montreal, Canada, May 3 and 4, 1956.

omits consideration of transportation costs to the pier in Detroit. A more complete comparison of costs via Detroit and Baltimore would be the local transport cost to the pier in Detroit plus the water cost, compared with the long-distance transport cost to the pier in Baltimore plus the water cost. However, it seems clear that transportation savings would be realized.

In recognition of this possibility and for other reasons, the Maritime Commission has declared the Great Lakes-St. Lawrence route an essential trade route, making United States ships eligible for subsidies. Several United States shipping lines have applied; however, these subsidies may be omitted in this analysis because they also apply to Atlantic ports. Many of the Lake ports are anticipating increased overseas trade in their port improvement programs. The interest of foreign shipping lines is shown by existing direct overseas service at Lake ports. In 1955, there were 318 ship passages up the St. Lawrence canals to Canadian and United States ports from overseas points. 25/ Of the total passages, 304 were made by ships of foreign registry (other than Canada or the United States), 14 by Canadian ships, and none by United States ships.

This direct overseas trade from Lake ports existed before World War II. Sailings were discontinued during the war, but were resumed in 1946. By 1955 the tonnage of imports and exports for both Canada and the United States had risen to about 700,000 tons. 25/ Total direct overseas exports from United States Lake ports were 288,000 tons. Agricultural products, mostly animal oils and fats, hides and skins, and animal feeds, made up 40 percent of the total direct exports, but no wheat, very little corn, and only small quantities of other grains and grain products were included (table 19).

Some drawbacks are evident, in spite of possible transportation savings, interest by shipping firms, and past experience. Transportation savings are not the sole factor in determining the route used by shippers. 26/ The Seaway will provide shipping service to a limited number of overseas points, because of the size of ships which can be used. Type and volume of direct exports overseas from United States Lake ports in the past have not included bulky agricultural products like grain, except in the form of animal feeds. 27/ Loading and unloading personnel and equipment for year-around shipping service will have to be maintained at both Lake and Atlantic seaboard ports.

---

25/ Dominion Bureau of Statistics, Canal Statistics Annual Report for 1955.

26/ By analogy it may be argued that transportation costs for New England produced exports are in most cases lower by shipping via Boston. In spite of this, 75 to 80 percent of New England produced exports move via non-New England ports. Infrequent sailings from Boston is considered the primary reason. Staff Memorandum No. 12, Committee of New England, February 1953.

27/ Grain movements through the Welland and St. Lawrence Canals in the past (table 16) have been Canadian shipments.

Table 19.- Direct exports overseas from United States Great Lakes ports, average 1949-53, annual 1953-55

| Commodity group | 1949-53 average | 1953 | 1954 | 1955 |
|---|---|---|---|---|
| | 1,000 short tons | 1,000 short tons | 1,000 short tons | 1,000 short tons |
| Edible animals and products | 19 | 28 | 18 | 37 |
| Inedible animals and products | 5 | 20 | 49 | 39 |
| Vegetable food products and beverages | 9 | 18 | 12 | 41 |
| Inedible vegetables except fibers and wood | 3 | 4 | 6 | 10 |
| Textile fibers and manufactures | 2 | 2 | 2 | 5 |
| Nonmetallic minerals | 16 | 16 | 22 | 28 |
| Metals and manufactures except machinery and vehicles | 12 | 12 | 36 | 42 |
| Machinery and vehicles | 26 | 32 | 31 | 33 |
| Chemicals and related products | 2 | 3 | 12 | 15 |
| Commodities, n.e.c. | 11 | 26 | 22 | 38 |
| Total 1/ | 105 | 161 | 210 | 288 |

1/ Does not include Department of Defense and S. C. i. cargoes.

Department of the Army, Corps of Engineers, Water-Borne Commerce of the United States, Annual Reports for 1949-55.

For example, the fact that Great Lakes ports will not be able to provide year-around service may make it even more difficult to attract trade. Loading and unloading equipment and personnel would have to be duplicated and maintained in duplicate for year-around service. Banks, insurance companies, steamship offices and foreign trade brokers would have to provide representatives at both Lake and Atlantic ports. The railroads and ocean ports would have to provide winter service.

Even if duplication is relatively unimportant, Great Lakes ports may be able to provide only limited service to world ports. Exports go to hundreds of places in the world. Many exporters desire carriers which are available on a relatively frequent basis. New York enjoys a leadership in this respect and no doubt will continue to attract much of the export trade. For longer voyages such as those to South America, Africa, Australia, or Asia, it is desirable to use relatively large ships. The limited draft in the Great Lakes may make the use of larger ships impossible.

If direct overseas exports from Great Lakes ports increase 10 times, the maximum possible under present conditions for all ports on the Great Lakes, and if nonagricultural commodities share proportionately in the increase, then tonnage of farm products shipped by this route will not increase greatly. 28/ The estimate of a tenfold increase may be optimistic in view of limits on the capacity of the Welland Canal. However, a tenfold increase in the present volume would raise direct overseas agricultural exports from Lake ports to about 1 million tons. It has been mentioned that present direct exports include no wheat and very little other grain.

There are reasons to believe that direct overseas trade of the Lake ports will increase but the author also believes there are reasons to question a rapid or extensive increase. The prospects for an increase in agricultural exports may be limited to the equivalent of 30 million bushels of wheat. In contrast, the study by J. R. Hartley suggests that the Seaway will be carrying from 150 to 200 million bushels of United States grain exports by 1966. Savings of 15 to 20 cents a bushel were visualized. 29/ However, D. L. McFarlane's recent paper examines this same question and although he is somewhat more optimistic than the writer about the rate at which overseas trade will increase, he concludes that a 10 cents per bushel cost reduction seems to be about as far as it is safe to go in estimating possible economies in the movement of wheat. 30/

Even if we assume so substantial an increase in grain shipments as 100 to 150 million bushels with transportation savings of at least 10 cents a bushel, the actual amount of assumed savings is still modest, 10 to 15 million dollars. To some extent this saving might so work in competitive channels as to tend to equalize the price of wheat which would mean an average savings, if prorated evenly over commercial sales of 800 million bushels of United States wheat, of 1.25 to 2 cents a bushel. Some wheat producers undoubtedly will benefit more than others from Seaway transportation while at the same time it is unlikely that all of the savings would go to wheat producers, especially so long as they find themselves selling in a surplus market.

## Potentials for Domestic Service

Extent of water transport service between the Great Lakes and the North Atlantic coast will be based partly on the capacity of the Welland Canal and its limits on ship size. In addition, such a service may not be able to operate at costs below existing transport rates nor be integrated with storage and processing facilities.

A possible level of costs for water service can be estimated from data for similar operations. Grain is an ideal commodity for shipment on this route. It is well suited to water transport, and about 2.5 million tons are received in New England alone each year.

---

28/ Danielian, N. R. Address at Detroit Economic Club luncheon, Detroit, Michigan, Nov. 15, 1954.

29/ Hartley, J. R., "The Effects of the St. Lawrence Seaway on Grain Movements," Indiana Business Report, No. 24, Bloomington, Indiana University, 1957.

30/ MacFarlane, D. L., "Impact of the St. Lawrence Seaway on Canadian and New England Agriculture," paper presented at the New England Agriculture Economics Council at Storrs, Conn., June 26, 1957.

But grain shipments alone may not be profitable. Normally, items with a higher value per pound cargo than grain are expected to bear a proportion of cost greater than their proportionate contribution to the total weight of cargo. However, regularly scheduled intracoastal and Great Lakes general cargo steamship service has experienced an extreme drop in volume during the last 10 years. If this service is not being maintained along the coast or within the Great Lakes, there is no substantial basis to expect a service will develop from the Great Lakes to Atlantic coast ports. This route is much more circuitous and, relative to the Atlantic coast, only a part-time operation of 7 or 8 months. Thus, if the service is to come into being, it may have to prove profitable for some bulk cargo like grain.

Only an ocean-going type ship could operate between Chicago and Boston. The maximum tonnage capacity of such a ship using the 27-foot depths of the Seaway has been estimated at 9,000 tons. The estimated per day cost of operating an 8,000-ton ship was $3,400. 31/ 32/ This includes tolls and other canal fees on the Seaway route, port charges, pilotage and insurance, as well as ship depreciation, repairs, fuel, crew wages, stores and supplies, and overhead. It does not include cargo loading and unloading. 33/ Subsidies do not enter into this estimate, for all domestic water commerce must be carried in United States registry ships. Subsidies are paid to United States shipping lines to enable them to compete with foreign registry shipping lines.

The estimated time required for a one-way trip for this ship is 14 days. This allows for sailing time at 14 knots, reduced speeds in restricted channels, delays at locks, loading, and unloading. The cost per 100 pounds from Chicago to Boston would be 30 cents on the basis of these estimates: 8,000 tons per trip, $3,400 a day for ship operation and 14 days per trip. Another cost would be loading and unloading the ship. Including weighing and inspection, this operation would cost about 8.5 cents per 100 pounds. 34/

---

31/ Vincent, S. A., "The Economics of Future European Great Lakes Freighter Service." (See footnote 24, p. 35.)

32/ In the first part of this article $2,000 to $3,000 was stated as the per day cost of operating an ocean-going ship, which represents costs for older ships and for foreign flag ships.

33/ Since this cost figure is for a 4,023 nautical miles voyage, it would not be strictly comparable with a per day cost on a 2,328 nautical miles voyage from Chicago to Boston. Furthermore, this estimate assumes 4 to 5 days for loading and a similar time for unloading. With a bulk cargo, like grain, loading and unloading might well be done in less time. With shorter trips (more tolls for passage through the canals and locks and more port and pilot charges) and less time in port (higher fuel consumption) there is reason to believe that the per day ship operating cost estimated is an underestimate rather than an overestimate.

34/ This figure includes unloading rail cars and loading ship at Chicago, unloading ship and loading rail cars at Boston. Rates were taken from testimony presented by J. T. Sanders, Legislative Counsel, The National Grange, at Senate hearings on the St. Lawrence Seaway, Apr. 14, 1953.

Finally, a local transportation charge would have to be paid from Boston to markets in New England. This is an added cost, since the rail rate from Chicago to Boston applies to all points in New England except northern Maine. The lowest local rate in New England using Brattleboro, Vermont, 35/ as an origin is 14 cents per 100 pounds to nearby points.

The total of all these per 100 pound costs (30 cents for ship operation, 8.5 cents for loading and unloading, and 14 cents for local transport, or 52.5 cents) is 4 cents higher than the present "proportional" rail rate of 48.5 cents per 100 pounds from Chicago to Boston. 36/

The cost estimate for ship operation might be materially reduced using old ships or ships with larger carrying capacity. However, costs have been calculated on only a one-way voyage. If this service were to come into being, some cargo will have to be found to bear the cost of the return voyage. New England does not offer such cargo. Iron ore might be picked up at Seven Islands, but an ocean-going ship of 8,000 tons would not be able to cover its full cost of operation. The rates for this service would be lowered by competition from lake-type ships which could operate from Seven Islands into the Great Lakes.

Even with a saving in transportation costs, a water service would not integrate storage and processing of grain and cover as wide an area as rail service. In the movement of grains from the West and Midwest to consuming centers in the East, numerous facilities have been built along rail routes. Storage, milling, and mixing "in-transit" are privileges offered by the railroads. Through rates are paid for transportation while products change form and are brought together from many areas. Many milling and mixing facilities are located between Chicago and Boston.

Supply would be a problem in winter, when the Great Lakes are frozen for 4 to 5 months of the year. Transportation would have to revert to rail transport or large storage facilities would have to be provided in the East.

For shipment of such perishables as meats by the Seaway, time in transit might rule out a water service. For canned goods, duplication of storage facilities and stronger packaging would be necessary for a water service. More breakage and pilferage might occur. Hides and skins might be suitable cargoes if it were not for extra handling and local transportation charges to and from ports.

---

35/ Brattleboro, Vermont, is used here instead of Boston because the local rate from Boston is higher than the rate which would exist if volume movements from Boston occurred.

36/ Brown, A. A., unpublished study of freight rates on feed grains for New England, University of Massachusetts, Amherst, Mass., 1955.

## Conclusions 37/

The Seaway will be an important improvement in the Great Lakes-St. Lawrence Waterway System. The deepening of interlake channels which was authorized after work started on the Seaway will also increase potentials. If the Welland locks create another bottleneck, twinning of the five single locks will be needed. Harbors will need deepening and port facilities may have to be improved.

Even with these improvements, it is likely that the Great Lakes-St. Lawrence route will remain primarily an inland waterway. The shallow channels and ports are not the only limiting factor. The route is open only 7 to 8 months of the year. Apparently, the Great Lakes-St. Lawrence route will not provide a lower cost transportation service between the Midwest and the eastern seaboard. Despite this, it is a valuable transport artery for bulk commodities such as iron ore, coal, petroleum, and grain. Direct shipments between the Lakes and the ocean will not be new, but this route will play a growing part in transportation for both Canada and the United States. It seems unwarranted, however, to visualize immediate or radical changes in existing channels of trade for agricultural products from the United States. Over a longer period, however, changes in this respect may be significant. If the Seaway potential is increased under the pressure of larger cargo movement, existing channels of trade for United States agricultural products, including location of processing facilities, may gradually shift.

---

37/ It should be pointed out that the discussion of rate comparisons in this report is a preliminary analysis based upon a few possible examples and perhaps inadequate cost figures. A more detailed analysis is currently being made by the Transportation and Facilities Branch of the Agricultural Marketing Service, USDA.